



REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY**  
**SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS**

333 Market Street, Room 923  
San Francisco, California 94105-2195

CESPD-MT-E (1110-2-1)

**18 DEC 2001**

MEMORANDUM FOR

Commander, Albuquerque District  
Commander, Los Angeles District  
Commander, Sacramento District  
Commander, San Francisco District

SUBJECT: SPD Regulation 1110-2-1, Land Development Proposals at Corps Reservoir Projects

1. References:

- a. Memorandum, CESPD-PD-R, 7 May 1992, subject: Policy of Corps Reservoir Lands.
- b. Policy Guidance Letter No. 32, 28 April 1993, subject: Use of Corps Reservoir Flowage Easement Lands.
- c. Memorandum, CESPD-ET-EW, 20 May 1999, subject: Hydrologic and Hydraulic Evaluation of Balancing Cut and Fill Volumes for Land Development Proposals at Corps Reservoir Projects.

2. Enclosed is the completed CESPD Regulation 1110-2-1, Land Development Proposals at Corps Reservoir Projects. This regulation accounts for previously issued USACE regulations, interim policy guidance, SPD memorandums, internal correspondence and the latest analysis of impacts by land developments proposals under consideration. It is a valuable tool. It establishes SPD policy and procedures, including checklists and diagrams your districts must use in evaluating land development proposals at Corps reservoirs within SPD.

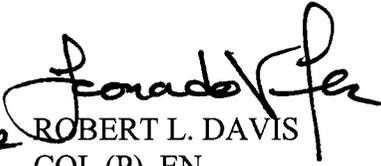
3. Land development within Corps reservoir projects continue to present new challenges. They require a thorough analysis of negative impacts on flood storage space especially those that effect critical features of the Spillway Design Flood and the Probable Maximum Flood. There are an increasing number of developments being proposed within Corps project lands. There is a balance between the requirements to adhere to established policy guidance, while at the same time working with the developers.

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4. This regulation will also be made available on the SPD Internet Homepage at <http://www.spd.usace.army.mil>. Questions regarding the above or enclosed may be directed to Ms. Theresa Mendoza or Mr. Boni Bigornia of my staff at (415) 977-8106/8102.

Encl

*For*   
ROBERT L. DAVIS  
COL (P), EN  
Commanding

DEPARTMENT OF THE ARMY  
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS  
333 Market Street, Room 923  
San Francisco, California 94105-2195

CESPD-MT

CESPD REGULATION  
NO. 1110-2-1

November 2001

Engineering and Design  
LAND DEVELOPMENT PROPOSALS AT CORPS RESERVOIR PROJECTS

1. Purpose. This regulation establishes South Pacific Division (SPD) policy for evaluating land development proposals within reservoirs and flood basins of the Corps, and for documenting the results of the evaluation. Land development proposals are those by companies, organizations, private parties, governments, agencies, or any other entities to construct buildings, roads, or other facilities or in any other way to modify the landforms, vegetation, surface characteristics, or use of lands within a reservoir or basin operated by the Corps for flood control. The Corps has responsibility to assure that the project purposes are not compromised, that the public is not endangered, and that natural and cultural resources associated with project lands are not harmed. The points and procedures for evaluation of development proposals in this regulation are to assist in meeting these responsibilities and complying with applicable laws and directives.
2. Applicability. This regulation is applicable to all SPD Districts and other field operating activities within this command.
3. References.
  - a. EO 11988, Floodplain Management, 42 F.R. 26951, 24 May 1977.
  - b. ER 1165-2-26, Implementation of Executive Order 11988 on Floodplain Management, 30 March 1984.
  - c. ER 405-1-12, Real Estate Handbook, 20 November 1985.
  - d. ER 200-2-2, Procedures for Implementing NEPA, 4 March 1988.
  - e. ER 1110-2-240, Water Control Management, 24 May 1990.
  - f. EP 1165-2-314, Flood Proofing Regulations, 31 March 1992.

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This regulation supercedes: CESPD-DE Memorandum, Subject: Interim Guidance for Evaluating Development within Corps Reservoir Projects; Dated 7 May 92 and CESPD-ET-EW Memorandum, Subject: Hydrologic and Hydraulic Evaluation of Balancing Cut and Fill Volumes for Land Development Proposals at Corps Reservoir Projects; Dated 20 May 99.

- g. Policy Guidance Letter No. 32, Use of Corps Reservoir Flowage Easement Lands,  
28 April 1993.
- h. ER 1130-2-530, Flood Control Operations and Maintenance Policies, 30 October 1996.
- i. ER 1130-2-540, Environmental Stewardship Operations and Maintenance Policies,  
15 November 1996.
- j. ER 1130-2-550, Recreation Operations and Maintenance Policies, 15 November 1996.

4. Delegation of Responsibilities. The water control authorities and responsibilities of all commands are executed through the Districts' Water Control Operations Centers or Reservoir Control/Regulation Sections.

a. Commander, South Pacific Division will:

(1) Establish Division-wide policies and procedures concerning evaluation of land development proposals;

(2) Establish and maintain close contact with the District staff relative to the land development project and provide advisory assistance as required; and

(3) Conduct review of land development proposals prior to approval by the District Commander to insure national and regional consistency in policy application.

b. District Commanders will:

(1) Establish and execute the reservoir operations program in accordance with policies;

(2) Establish and maintain liaison with SPD personnel in Water Control, Operations Division and Real Estate and Environmental relative to the land development project;

(3) Conduct an internal review by all pertinent offices within the District, including the District's Water Control, Engineering, Operations, Real Estate, Planning Divisions, Environmental and Counsel;

(4) Prior to approval, submit land development proposals to SPD for review to insure national and regional consistency in policy application; and,

(5) Approve or disapprove development proposals and retain the evaluation package on which the decision was based.

5. Factors To Be Considered for Developments in SPD Reservoirs. A formula cannot be developed to calculate the acceptability of a development project but numerous factors should be considered in the evaluation of land development proposals.

a. **Real Estate Requirements.** Proposed developments need to be evaluated to ensure they do not conflict with the terms of real estate interests held for the project or constrain future operational flexibility of the project. Provisions to be put into new real estate outgrant instruments should include recognition of the fact that the water control plan is expected to change in the future and that flood releases are based on the most current water control plan. A decision to limit developments on project lands must be consistent with the underlying provisions of the applicable real estate interest held by the Government or the project sponsors. Before making a final determination on the proposed development, the Offices of Real Estate and Counsel should be consulted.

b. **Reservoir Storage.**

(1) Developments that occur within an SPD reservoir (i.e., on either lands held in fee or on lands in which USACE or local sponsors may have real estate interests) will not be allowed to reduce the reservoir's project storage space. This requirement includes the space for the Spillway Design Flood (SDF). The Probable Maximum Flood (PMF) design space is a critical feature in the operation of a Corp reservoir project. The primary consideration in approving excavations or landfill placements is the preservation of "project storage capacity" of the project. "Project storage capacity" is herein defined to include all hydrologic and hydraulic needs of the project, which encompasses the volume for the entire project, i.e., sedimentation, hydropower, recreation, agriculture, water supply, and spillway design flood.

(2) Most developments require cut and fill operations that change the original topography of the flood control basin. Even if there is a balance of cut and fill, there may be an adverse effect on flooding frequency within the basin due to the change in the area-capacity curve. The cut and fill operations must not cause any property to be flooded more frequently than before the development was in place. This can be done by ensuring that for every elevation on the modified area-capacity curve, an equal or larger reservoir volume would be created by the development, i.e., for any "fill" volume, an equal or greater volume of "cut" must be removed at an elevation below the fill. Impoundment areas such as lakes or spreading basins should be evaluated as "fill" if they are not designed to release their water from the reservoir (i.e., gravity flow, pumping or recharge) prior to a flood.

(3) Cumulative degradation of project storage through land development that does not mitigate for this lost volume has an insidious effect on the hydrologic design and operation of the project. Therefore, proposals for excavation and grading of the flowage easement that result in loss of project storage will not be approved unless substitute flood storage is provided.

(4) Normally, to account for losses in volumetric space caused by vertical development, the best engineer practices would require developers to balance cut and fill up to the elevation at Maximum Reservoir Level (MRL). Unfortunately, from the point of volumetric calculations and legal control, real estate rights are not generally acquired for land between the elevation of the guide acquisition line (or take line) and the elevation of the top of the dam. Clearly, for land developments beyond our acquisition line we have no legal authority to regulate incursions in the vertical space that would otherwise be available for floodwaters in a design flood event. This acquisition policy represents an attempt in balancing hydrologic design requirements and political realities of real estate acquisition.

(5) When reviewing proposed developments that at least partially occur on project-owned lands, best engineering practices should be taken into account in considering any adverse impacts to dam safety during a design flood. In such instances, when the proposed development would interfere with the purpose for which the project easement or fee interest was acquired, the Government has the authority to require volumetric mitigation for that portion of the development proposal over which the Corps has real estate rights to the top of the MRL. (See Appendix A, figure 1)

(6) The Government has no jurisdiction for vertical space above land over which no real estate interests exist. However, as stewards of the project, the Corps can encourage the developer to mitigate for that volumetric area (storage space) that is removed from the project storage space above the project acquisition line by the proposed development. (See Appendix A, figure 2 and 3).

(7) In cases where there is a new development on lands that would be inundated by the PMF, but over which the Corps has no real estate interests, or when a new PMF has been developed, there exists a need to ascertain the integrity of the Corps project and any dam safety issues resulting from the routing of the PMF. In such cases, the following analysis should be performed, in coordination with the Dam Safety Assurance Program. The PMF inflow flood should be (mathematically) routed through the reservoir making the assumption that over such lands, the storage space is not available. This assumption should reflect actual and reasonably projected development throughout the life of the project. Such an analysis would relieve the District from a need to seek volume mitigation over lands over which we have no control, and also ensure that 100 percent of the PMF can be safely passed over the spillway. This new routing may result in a higher water surface elevation, and may indicate a deficient spillway. In such cases, the Dam Safety Assurance Program should be engaged resulting in a study to determine appropriate corrective action. Corrective action might take the form of either enlarging the spillway, raising the dam, use of a parapet wall on top of the dam to meet freeboard deficiencies, re-operation of spillway gates, acquiring rights over private land between the elevation of the dam's spillway and the elevation of the top of dam, or a combination of these alternatives. In some cases, it may prove more acceptable to purchase easement rights, as opposed to raising the dam (or some other combination of solutions).

c. Flood Damage to Property. In general, where land developments occur, it should be susceptible to period flooding. Buildings that contain utilities, records and/or equipment should either be flood proofed or should have contingency plans developed for evacuation of moveable items before the flood. A modified version of the Los Angeles District's Minimum Criteria for Reservoir Land Use Projects has been adopted for regional use and is presented as Appendix B. Use of this table will provide consistent criteria for developers upon which to base their conceptual plans.

d. Flood Damage to the Reservoir.

(1) Floatables. If the development has storage tanks, vehicles, or any other article that could float during a flood, each item must be adequately anchored to prevent it from becoming dislodged due to buoyancy and/or swift currents. A floating object could get drawn into the intake structure (act as a plug) and potentially cause loss of control of the project. They also could get swept over the spillway, creating the potential for serious damage to structures or property downstream.

(2) Release of Pollutants. The water quality of water stored or released from Corps reservoir projects is the responsibility of the Corps. If a development stores or handles pollutants, leakage or accidental discharge into the flood waters could lead to environmental problems, both within and downstream of the project. Operational constraints during this event could include a need to hold polluted floodwaters until they can be treated or recovered. This could create a dangerous situation in which scheduled releases cannot be made. This additional operation constraint would narrow the range of options for water control decisions. Need to evaluate risk of releases and where necessary take corrective actions.

(3) Debris Build-up and Cleanup within the Flood Control Basin. Some development proposals are large enough to affect the natural flow of sediment into the reservoir. This could cause larger quantities of sediment and/or debris to deposit in the reservoir where it had not been anticipated. If debris impinges on inflow into the reservoir, the problem could cause additional flooding. Also, the designs of the outlet works, spillway and embankment are based on the net area-capacity curve, which is developed based on the sediment distribution. Extreme changes in sediment distribution may affect the operation of the project as designed. Additionally, the build-up of debris or sediment in an area that used to be free flowing could lead to redirection of flows that produce detrimental erosive forces. If the redirected flows were to impinge upon the dam embankment, the safety of the dam could be compromised. Cleanup of the development could be very costly. Therefore, flow paths must be examined to avoid these problems.

e. Existing and Planned Project Use. Many projects have Master Plans that guide the use of resources and the orderly development of project lands. All development proposals should be reviewed for consistency with the Master Plan to assure that the proposed development will not conflict with existing or planned uses. If the review indicates that the proposed development is

either inconsistent with the Master Plan or may conflict with existing or planned uses, the Master Plan will be updated or supplemented prior to approval of the proposed development.

f. **Induced Constraints to System Flexibility.** Reservoir projects need operational flexibility in order to deal with forecast errors, operational inefficiencies, and delays in meeting operational objectives, emergencies, and unique situations. Flexibility is needed to allow the water control manager to adapt the water control plan to special circumstances that may arise in the river system. If a rising pool level in the reservoir were to approach a development where damages could result, the water control manager should not be placed under pressure to release flood waters that otherwise may have been held back to prevent further flooding of the downstream system. In most cases, one of the primary purposes of the project is to provide flood protection for these downstream areas. Real-time flexibility gives the water control manager the ability to make modifications to the water control plan, and, if necessary, to make best use of the reservoir and the overall reservoir system. Therefore, the proposed development must not adversely affect the system operations.

g. **Constraints to Future System Flexibility.** Water control managers must also deal with future changes in the watershed (physiography and development), new hydrologic data and technology, operational experience, changed downstream conditions (increased/decreased channel capacity), changing emphases (e.g. environmental concerns, water quality, water conservation, recreation, etc.). Many Corps reservoir projects are no longer able to provide the degree of protection for which they were originally designed, due to one or more of the above reasons. Re-regulation studies are undertaken to try to optimize the operational objective function, i.e., to determine how the project can best be operated to maximize the public benefit. Developments that may appear to be acceptable under present conditions may not be acceptable when considering future needs for operational flexibility. The future flexibility of the project and the entire river system to meet authorized purposes should not be compromised by inappropriate reservoir development.

h. **Public Safety Problem.** Some development proposals result in an increase in the number of people or animals within the reservoir. The size of a proposed development should be evaluated. Facilities that can hold a large number of people might be denied for safety reasons. Examples of large facilities that might not be allowed in flood control basins are: hospitals, schools, libraries, museums, theaters, shopping centers, and amusement parks. A development may also attract a larger number of people than it was designed for. For example, an underground parking lot may attract children as a play area or may attract transients as a sleeping area. Because these developments were not originally intended to have people playing in, or occupying them, contingencies would likely not have been set up to evacuate the people in the event of a flood. Therefore, public safety would be at risk. Part of the liability could be attributed to the Corps, adding risk and potential delays to water management decisions. Flooding of electrical circuits and wiring may create special hazards to evacuation procedures. Some developments create hidden dangers and must be carefully evaluated for potential public safety problems.

i. Environmental Stewardship. Environmental ramifications of any proposed development must be fully explored and all requirements for assessing, coordinating, and reporting possible impacts must be followed. Some of the basic responsibilities for environmental stewardship at Corps-operated reservoirs are described in reference 3i, though there are numerous other pertinent directives dealing with requirements relating to NEPA, the Endangered Species Act, the Fish and Wildlife Coordination Act, the Clean Water Act, the Clean Air Act, the National Historic Preservation Act, etc. Any land development proposal should be coordinated as soon as possible with the Operations and Environmental elements so that the necessary steps to gather information and to deal with environmental requirements and procedures can be planned out, as some of these might be expensive and time consuming.

6. Contingency Plan. A Contingency Plan should be developed for any development within the flood control basin that is subject to hazardous conditions and damages from a flood event. A thorough technical analysis by the developers will force them to consider what emergencies could arise within a flood control basin and determine what contingency measures are required to deal with them. The agreement, which allows development, should state that it is the sole responsibility of the developer to evacuate the area. At projects where monitoring exists, the District would attempt to make notifications to affected interests. The agreement should further state that: "Prior to commencement of construction, the developer will produce and finalize an evacuation contingency plan." This will ensure that a procedure has been worked out beforehand. The plan shall not be reviewed or require approval from the Corps; however, its contents should include standard operating procedures for: regular patrols of the area (if warranted); warning systems, their triggering mechanisms, their thresholds and minimum warning times based on the hydrology of the watershed; mobilization of equipment and manpower for evacuation of humans, animals and/or records, utilities and equipment; emergency notifications (phone number and personnel lists); access roads and escape routes; and clean-up and repair.

7. Reporting. The evaluation of any land development within a flood control basin must be well documented. The report must explain what factors were evaluated and what the results of the evaluations were. The level of detail appropriate in the documentation will vary depending on the specifics of the proposal, but must be sufficient to explain and support the recommendation and decision. The completed evaluation package, including the proposal and environmental documentation, is to be submitted to SPD for review to insure national and regional consistency in policy application, prior to approval action by the District Commander. A checklist of minimum requirements for a report is outlined in Appendix C, Evaluation Criteria Checklist for Land Development Proposals.



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4 Appendices

App A – Typical Cut and Fill Volumes for Land Development Proposals (Figures 1 thru 3)

App B – Minimum Criteria for Reservoir Land Use Projects

App C – Evaluation Criteria Checklist for Land Development Proposals

App D – Glossary

# Appendix A – Typical Cut and Fill Volumes for Land Development Proposals

|   |  |
|---|--|
| <p><b>Figure 1</b></p> <p>Projects entirely on Corps controlled lands</p>                   | <p>V1 &amp; V2: Volume of fill added to reservoir due to new development.<br/> V1' &amp; V2': Volume of fill required to be removed from reservoir to mitigate for V1 &amp; V2.</p> <p>MRL: Maximum Reservoir Level</p>  |
| <p><b>Figure 2</b></p> <p>Projects that straddle Corps and non-Corps controlled lands</p>   | <p>V1 &amp; V2: Volume of fill added to reservoir over Corps controlled lands due to new development.<br/> V3: Volume of fill that the new development would add to reservoir over non-Corps controlled lands.<br/> V1' &amp; V2': Volume of fill removed from reservoir to mitigate for V1 &amp; V2.<br/> V3': Volume of fill that developer should be encouraged to remove from reservoir lands.</p> <p>MRL: Maximum Reservoir Level</p> |
| <p><b>Figure 3</b></p> <p>Volumes to be excluded from consideration in PMF computations</p> | <p>PMF: Probable Maximum Flood</p> <p>V4: This volume (or a percentage thereof) will be assumed to be unavailable in routings for dam safety design (PMF) calculations/determinations.</p> <p>MRL: Maximum Reservoir Level</p>   |

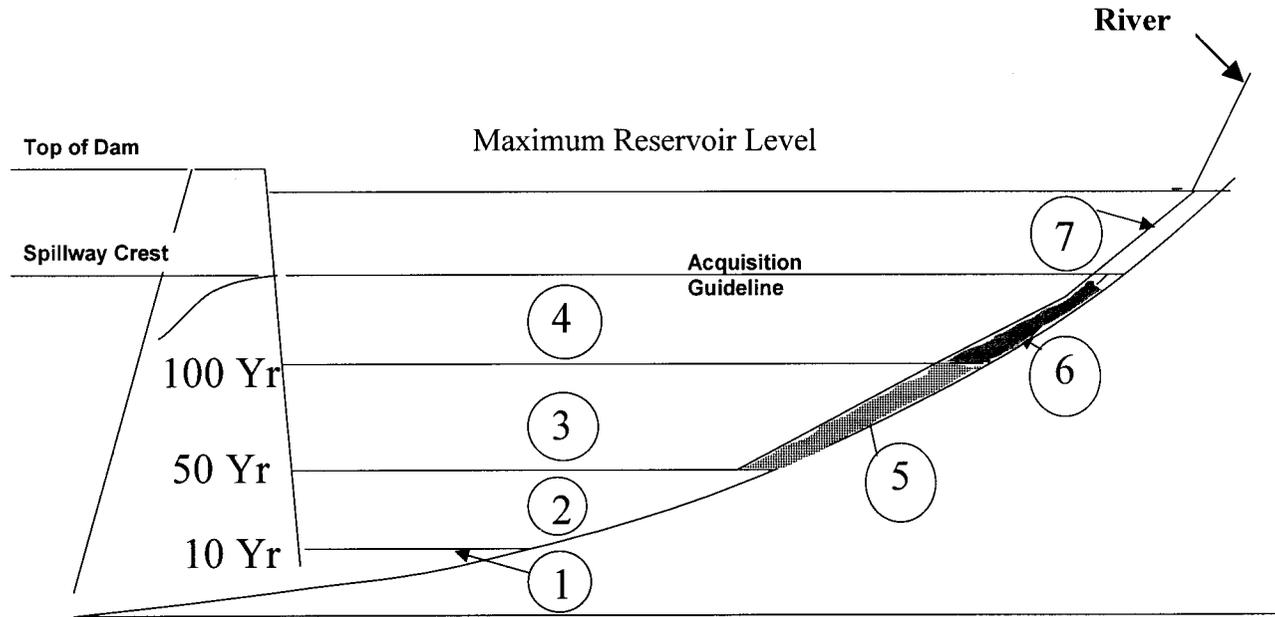
## Appendix B -Minimum Criteria for Reservoir Land Use Projects

| Location          | Figure Level | (*)Elevation Frequency Range  | Development Constraints  | Acceptable Land Uses   |
|-------------------|--------------|---|--|--|
| Reservoir         | 1            | Up to 10-yr flood   | Subject to prolonged inundation, sedimentation, and wave erosion | Structures are not recommended. Nature trails and open play fields are acceptable.   |
|                   | 2            | 10-yr flood to the 50-yr flood  | Subject to frequent flooding, sedimentation, and wave erosion    | Open or floodable structures and field facilities that can sustain inundation with acceptable maintenance costs. Concession stands with portable contents, bridle trails, shade and picnic armadas, backstops, goalposts, etc. are considered appropriate. |
|                   | 3            | 50-yr flood to the 100-yr flood   | Subject to periodic flooding, sedimentation, and wave erosion    | Floodable structures and multipurpose paved surfaces that can sustain inundation with acceptable maintenance costs. Floodable restrooms and picnic area are considered appropriate.  |
|                   | 4            | 100-yr flood to the Reservoir Design Flood                                  | Subject to infrequent flooding, sedimentation, and wave erosion  | Flood-proofed, closed structures are permitted. Structures conducive to human habitation are prohibited.   |
| River floodplains | 5            | Below the reservoir 100 yr flood elevation and up to the 100-yr river flood | Subject to frequent flooding, sedimentation, and wave erosion    | Open-type or floodable structures and field facilities that can withstand flood-flow velocities for 100-yr conditions and will not impede the passage of flood flows.  |
|                   | 6            | Above the reservoir 100 yr flood elevation and up to the 100-yr river flood | Subject to frequent flooding, sedimentation, and wave erosion    | Structures are not recommended. This area must be reserved in an open manner to provide for conveyance of the 100-yr flood.  |
|                   | 7            | Above the reservoir 100 yr elevation and above the 100-yr river flood       | Subject to variable flooding, sedimentation, and wave erosion    | Flood-proofed, closed structures are permitted along the floodway fringe. All development must meet Federal regulatory floodway regulations and be approved by the District Engineer.  |

\* Frequency criteria shall be for a reservoir and watershed conditions of at least 50 yrs in the future. Most current frequency curve may be used as guidance in estimating future conditions. Note: Land uses at lower elevations may be developed at higher elevations

Before making a final determination on the proposed development, the Offices of Real Estate and Counsel should be consulted.

## Appendix B - Minimum Criteria for Reservoir Land Use Projects



Note: Refer to Table B of Minimum Criteria for Reservoir Land Use Projects for description

## Appendix C –Evaluation Criteria Checklist for Land Development Proposals

**Each Question that is answered contrary to the guidance should have an explanation.**

1. Corps Reservoir or Basin: \_\_\_\_\_

2a. Name of Development Proposal: \_\_\_\_\_

2b. Project No.: \_\_\_\_\_

2c. Project Manager: \_\_\_\_\_

Telephone No. \_\_\_\_\_

2d. District Reviewers:

Environmental: \_\_\_\_\_ Counsel: \_\_\_\_\_

Real Estate: \_\_\_\_\_ Operations: \_\_\_\_\_

Engineering: \_\_\_\_\_ Reservoir Regulation: \_\_\_\_\_

3. General Project Description:

4. Summary comment/recommendation for the proposed development:

5. Materials Reviewed:  Report(s)  Plan(s)  Other(s)

6. Titles and Date of Reviewed Materials:

7. Will the proposed development be located within the reservoir (defined as all land below the Maximum Reservoir Level?)  Yes  No  Cannot be Determined

8. Do any of the potentially affected easements conflict with the approved water control plan?  Yes (explain)  No  Cannot be Determined

9a. Will there be any “cut and fill” operations in preparation for the proposed development?  Yes  No  Cannot be Determined

9b. If “Yes”, would they allow drainage by gravity?  Yes  No  Cannot be Determined

10. Is there any loss of storage at any elevation below the Maximum Reservoir Level?  Yes (Explain)  No  Cannot be Determined

**Appendix C –Evaluation Criteria Checklist for Land Development Proposals**

11. Do any buildings, ponds, etc. remove or have the potential to remove (e.g., by sandbagging to save expensive property) flood control volume from the Corps project?

Yes      No      Cannot be Determined

12. If located within the reservoir, what is the elevation frequency range (currently) associated with the location?

below 10 Yr     10-50 Yr     50-100 Yr     greater than 100 Yr

13. Do the facilities/structures of the proposed development comply with the attached Appendix B “Minimum Criteria for Reservoir Land Use Projects?”

Yes      No (If No, explain)

14.a. Do you have a copy of the title, leasehold, or easement?

Yes      No

14b. Will the proposed development conflict with the Corps flowage easements or other Real Estate interests?  
( explain why)

Yes(explain)      No      Cannot be Determined

15. Is there a proposal for sale or exchange of land, or change in easement between the Government and the Developer?

Yes      No

16. Is a Categorical Exclusion (CATX) Required per ER 200-2-2?

Yes      No

17. Has the review been coordinated with Fish and Wildlife Service or the State Fish and Game Department?

Yes      No

18. Are there any existing or potential endangered species identified? (If Yes, provide list)

Yes      No

19. If Yes, what steps have or are being taken to mitigate for issues related to endangered species (present or future)?

## Appendix C –Evaluation Criteria Checklist for Land Development Proposals

20. What other environmental compliance requirements, if any, are to be met and what actions have been taken to satisfy the requirements? (For example, cultural resources, water quality, air quality, permit requirements, FAA coordination, non-source pollutant discharges, etc.)

21. Can any potential hidden constraints or dangers be identified (e.g., submergence of electrical wiring, underground parking, etc.)? Yes No Cannot be Determined

22. Will there be impacts to reservoir operations or potential impacts regarding operation constraints as a result of the proposed development (e.g., loss of reservoir storage capacity, increase of inflow volume into the reservoir, etc.)?

Yes No

23a. Are there any possibilities of damage to the Corps project as a result of the proposed development due to floatable objects/structures?

Yes No

23b. If “Yes”, is there a plan in place to mediate the problems with floatables?

Yes No

24a. Will there be any pollutants stored within the proposed development?

Yes No

24b. If “Yes”, what steps are being taken to minimize or eliminate contamination by pollutants?

25a. Will there be an increase in the quantity of debris/sediment inflow to the flood control reservoir as a result of the proposed development?

Yes No Cannot be Determined

25b. If Yes, how much (what rate?)

26. Will the proposed development include facilities/structures that can hold large number of people (e.g., hospitals, schools, libraries, museums, theaters, shopping centers, amusement parks)? Yes No Cannot be Determined

27. What are the proposed development’s impacts to the future operational flexibility of the dam?

28. Does the proposed development have any potential impact on ongoing studies (in-basin, downstream, or re-operation studies)? Yes No Cannot be Determined

29. Will any part of the proposed development conflict with Corps’ project Master Plans for the area of proposed development? Yes No Cannot be Determined

## Appendix C –Evaluation Criteria Checklist for Land Development Proposals

30. Recommendations:

31. Other Comments?

Submitted By: \_\_\_\_\_

Date: \_\_\_\_\_.

## Appendix D - Glossary

Acquisition Guideline - Often referred to as the Take Line or Guide Acquisition Contour, is the contour line established with a reasonable freeboard allowance above the top pool elevation for storing water for flood control, navigation, power, and irrigation.

Corps Controlled – Used to refer to lands held in fee and/or Corps held easements

Fill – Any earth, water, or man-made structure that, when placed on the reservoir land, reduces the storage capacity of the reservoir.

Floodplain - The lowland and relatively flat areas adjoining inland and coastal waters, and including, at a minimum, that area subject to flooding in any given year.

Maximum Reservoir Level (MRL) – The Maximum Reservoir Level is the elevation resulting from the routing of the Spillway Design Flood.<sup>1</sup>

Probable Maximum Flood (PMF) - Is the flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The PMF is calculated from the Probable Maximum Precipitation (PMP). The PMP values encompass the maximized intensity-duration values obtained from storms of a single type. Storm type and variations of precipitation are considered with respect to location, area coverage of a watershed, and storm duration. The probable maximum storm amounts are determined in much the same way as are standard project flood amounts, except the precipitation amounts are first increased to correspond to maximum meteorological factors such as wind speed and maximum moisture content of the atmosphere.<sup>1</sup>

Project Storage Capacity - As defined in this reference, project storage refers to the hydrologic and hydraulic needs of the project, which encompasses the volume of the entire project, i.e. sedimentation, hydropower, recreation, agricultural, water supply, reservoir design, and spillway design.

Reservoir Design Flood (RDF) – The Reservoir Design Flood is that flood, along with associated antecedent conditions, that was originally used to determine the design benefits and level of flood protection provided by the project. In most cases this is the event that determined the original spillway crest, or the boundary between the flood control pool and storage provided primarily for dam safety issues.

Spillway Design Flood (SDF) – Spillway Design Flood is the flood hydrograph used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.<sup>1</sup>

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<sup>1</sup> Reference EM 1110-2-1420, Hydrologic Engineering Requirements For Reservoirs, dated 31 October 1997.